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HEMORRHAGIC
SEPTICEMIA
"SHIPPING FEVER"
OF CATTLE



HEMORRHAGIC SEPTICEMIA is an infectious disease, attended with a very high mortality, which attacks various species of animals, especially cattle and sheep. The losses are greatest among young animals, especially those that are thin in flesh and poorly nourished. The disease is a septicemia or poisoning of the blood, wherefore it often runs a short course and the animal dies quickly.

In cattle the disease is sometimes termed shipping fever.

In sheep the disease frequently manifests itself in the acute form, with marked depression, high temperature, labored breathing, muscular trembling, and colicky pains.

The apparently healthy animals should be separated from the diseased and placed in clean, uninjected quarters, where they should have the best of feed and water. Bacterins and aggressins have proved to be effective in many instances in checking the spread of an outbreak and in protecting the unaffected portion of the herd or flock. The advisability of using these products should be left to the discretion of a competent veterinarian.

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HEMORRHAGIC SEPTICEMIA

" SHIPPING FEVER " OF CATTLE

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CAUSE OF THE DISEASE

HEMORRHAGIC SEPTICEMIA is caused by a specific micro-organism (*Bacillus bipolaris septicus*). Bacilli which resemble closely the organism of hemorrhagic septicemia are widely distributed in nature. They have been found in the soil, upon various plants, in stagnant water, and upon the moist nasal membranes of normal calves.

Some writers think that after the organisms have become virulent enough to cause an outbreak among animals, and the infection has been overcome, they will return later to their previous harmless stage. The increased virulence which is made evident by an attack on several animals of a single species appears to be effective only in animals of that particular species, and the disease does not readily spread to other species. For example, sheep that are pastured with a drove of cattle in which several deaths occur from hemorrhagic septicemia usually remain unaffected, although on another farm the sheep alone may contract the disease and all the cattle escape. If any exceptions to this rule occur they are extremely rare.

The infection may be transmitted to healthy, susceptible animals by the injection, beneath the skin, of blood taken from an animal that has recently died of the disease. From such blood it also is possible to isolate the specific microorganism which is capable of reproducing the disease in healthy animals.

The spread of the disease seems to depend nearly as much on the condition and susceptibility of the animal as on the contagious nature of the disease, as thin, poorly nourished young stock most frequently become infected and die.

A large number of outbreaks of hemorrhagic septicemia, particularly in cattle and sheep, are associated with the shipment of animals from one point to another by rail. This form of the disease is known as shipping fever and usually makes its appearance a few

days after animals reach their destination. There is no doubt that the vitality of the animals is lowered as a result of the rigors of transit and as a result some animals become highly susceptible to infection with the hemorrhagic-septicemia germ. Whether the animals, in their condition of lowered vitality, pick up the infection while in transit or whether the organisms, which may be present normally in certain animals, become virulent when the vitality of the individual is lowered, has not been definitely determined. The disease, however, usually confines itself to the animals that have been shipped and seldom extends to the native stock.

SYMPTOMS

In cattle the disease develops very rapidly, lasting from one to eight days. There is usually a steady elevation of body temperature until from 104° to 107° F. is reached. The animal refuses its feed. Swelling may appear beneath the skin of the head, throat, or dewlap. These enlargements are somewhat soft and pit on pressure. The tongue is often extensively swollen, and the animal drools and slobbers because of the irritation to its tongue and throat. There may be difficulty in breathing, depending on the degree of involvement of the air passages and of the lungs. Occasional coughing may occur. Muscular trembling may be evident. There may be a bloodstained discharge from the nostrils, and strings of mucus may hang from the mouth. Examination of the nostrils often reveals the presence of many small hemorrhages, or blood spots, just beneath their lining membranes. The eyelids become highly inflamed and tears flow.

There is an intestinal form in which the changes are found chiefly in the abdominal cavity, or the intestinal form may develop after the disease has appeared in the lungs. The stomach, intestines, and kidneys and the lymph glands belonging to them become studded with hemorrhages of various sizes, and the intestines become intensely inflamed. The consequence is that diarrhea sets in, and shreds of mucus and bloody droppings are passed. The intestinal form is rare, as most cases show severe involvement of the lungs and the symptoms of croupous pneumonia. The animal may stand with their forelegs wide apart in order to breathe more freely. They lose flesh very rapidly, their abdomens become "tucked up," and the eyes quickly become sunken. A staggering gait, caused by extreme weakness, sometimes is noticed.

A disease has been described under the name of septic pleuropneumonia of calves, which is a form of hemorrhagic septicemia caused by the characteristic germ. The symptoms shown by the affected calves are quite characteristic of hemorrhagic septicemia, and the post-mortem findings are also those found in that disease.

In sheep, young animals which have just been weaned are found to be most susceptible, the disease manifesting itself in an acute form. There is marked depression, high temperature, labored respiration, loss of appetite, muscular trembling, and frequently colicky pains. A subacute and a chronic form of the disease are also recognized, the latter affecting principally older sheep. Aside from the changes caused by fever, weakness, etc., there is noted in the subacute form a discharge from the eyes and nose which at first is watery, later being

mixed with matter. There may be also pulmonary impairment (pneumonia), or there may be evidence of inflamed intestines. Occasionally the symptoms subside only to return in a more chronic form, which manifests itself principally as a chronic affection of the lungs, with gradual emaciation. Sometimes the joints are involved, swelling of the knee joints being noted rather frequently.

ANATOMICAL CHANGES

Swellings will be found under the skin. If these enlargements are examined they are found to consist of collections of jellylike material tinged with blood. Occasionally they are limited to a single shoulder or flank, when they may be mistaken for blackleg. The lymph glands are enlarged and are injected with blood. The mucous membranes which line the respiratory tract are similarly affected. False membranes composed of fibrinous exudate (or discharge) may develop in the throat. The spleen remains almost normal. Hemorrhages are constant in the fatty tissues around the kidneys and within the walls of the intestines.

When the disease is chiefly in the chest the lungs are darkened in color and their fibrous tissues much thickened from the collection of bloody serum in their meshes. The diaphragm, heart sac, and heart walls show numerous bloody points and larger collections of blood.

In the intestinal form hemorrhages into the intestines are present and sloughing of the lining of the intestinal wall is observed, as a result of which the intestinal contents are wrapped in a covering of bloody mucus.

In acute forms the animals may die suddenly and the changes in such cases are not very marked. Bacteriological examination of the body fluids demonstrates the presence of the specific germs proving the nature of the trouble.

DIAGNOSIS

Because of their acute course, high fever, and rapid termination in death, some difficulty may be experienced in distinguishing anthrax (carbuncle), malignant edema (swelling), and blackleg from hemorrhagic septicemia.

There may be swelling of the throat or neck in either anthrax or hemorrhagic septicemia. An examination of the spleen of the affected animal will give a conclusive diagnosis, for the spleen of an animal dead from anthrax nearly always becomes acutely swollen and its pulp becomes softened. In cases of hemorrhagic septicemia small hemorrhages are usually present in the kidney fat. Bacteriological examination will demonstrate quickly the presence of the specific organisms of anthrax or of hemorrhagic septicemia, and a test should be applied in all doubtful cases. The value of a definite diagnosis will be recognized when the lasting nature of an anthrax infection, with its consequent lowering of the value of the affected premises and the more transitory character of an outbreak of hemorrhagic septicemia, are considered.

Blackleg and malignant edema may be detected usually by the formation of gas within the swellings upon the body, and the bubbles thus developed will produce a crackling sound if the fingers are

pressed over the affected area. Further, in blackleg the marked change in the affected muscles and the characteristic "rancid-butter" odor noted in cases of blackleg facilitate a differential diagnosis.

PREVENTION

Through the use of bacterial vaccines animals may be protected experimentally from contracting hemorrhagic septicemia. Cattle and sheep, if treated with weakened cultures of hemorrhagic-septicemia germs obtained from animals of the same species as that to which they themselves belong, usually will become protected against injections of living cultures of the same germ, even though applied in comparatively large quantities. Tests made by the Bureau of Animal Industry have shown that the use of cultures from animals of another species often affords similar immunity. Sheep have been made immune from virulent cultures obtained from other sheep by the use of prepared cultures from cattle. Rabbits have been made resistant to hemorrhagic-septicemia cultures, derived from a variety of different species of animals, by treatment with prepared cultures coming from animals of other species. Although it is possible to immunize against this disease by the use of weakened cultures of hemorrhagic-septicemia organisms, such living-organism vaccines are not entirely without danger. Bacterins prepared from killed cultures have the advantage of safety even though the protection may be somewhat less than is obtained by the use of living-organism vaccines.

Recently the Bureau of Animal Industry developed a new protective agent against this disease, known as hemorrhagic-septicemia aggressin. Numerous experimental animals were vaccinated with this material and subsequently were given a severe artificial exposure together with some unvaccinated control animals. In these experiments all the vaccinated animals remained healthy, while the unvaccinated ones developed fatal hemorrhagic-septicemia infections.

This aggressin is a germ-free, sterile product. It is now manufactured under commercial conditions and is proving to be quite as efficacious in practice as it has proved experimentally.

From what is known of the shipping-fever form of hemorrhagic septicemia, it is believed that best results from immunization against this form of the disease should be obtained by the vaccination of the animals with aggressin or bacterins at least 10 days before they are shipped from the home farm.

TREATMENT

In most cases medicinal treatment of a fully established case of hemorrhagic septicemia in an animal of any species is quite useless. Visibly sick animals are best treated by the administration of immune serum. Such serum can be purchased from several of the biological houses now operating in the United States. One or two injections of 50 cubic centimeters each will frequently suffice to bring about the recovery of these animals. All apparently well animals should be removed from sick ones by placing them in separate, noninfected quarters. If new cases develop among them in a few days after their removal, the healthy ones remaining should be removed again.

to another locality. In that way the unaffected animals soon will be out of danger of further contamination, especially if their strength has been supported by an abundance of good feed and water during the separation.

DISINFECTION OF PREMISES

Inasmuch as hemorrhagic septicemia is a microbial disease produced by organisms which multiply rapidly in the animal body, the carcasses of animals dead of the disease should be burned or buried.

Premises usually become infected with hemorrhagic septicemia by stock cattle that have recently passed through some of the larger cattle markets. All stables, sheds, or yards that have contained infected animals should be disinfected. The interior of the stables, especially the mangers and manure trenches, should be washed with a disinfectant, such as liquor cresolis compositus (U. S. P.), 4 ounces to the gallon of water, or carbolic acid, 6 ounces to a gallon of water. The yards may be disinfected by the application of a solution made of 5 ounces of copper sulphate to a gallon of water. The best way to apply disinfectant solutions is to use a spray pump such as is used in spraying orchard trees. All refuse and material from the stable and barnyard should be removed to a place not accessible to cattle, or sheep. The manure should be spread on fields and plowed under. A plentiful supply of light and air should be provided for the contaminated stables. Open fields or pasture lands are cleansed rapidly by the action of sunlight.

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